Chapter 2:

Asthma Management and Quality of Life

Asthma Management and Quality of Life

The goal of effective management of asthma is to allow children and adults with asthma to function with minimal restrictions and enjoy a good quality of life throughout their lives. There are several ways to monitor and support management and self-management of asthma. These include: determining the frequency of episodes of the asthma over time, staging the condition according to daytime and nighttime symptoms and lung function, reporting about quality of health, life and activity limitations from persons and their families, use of school and child care action plans to assist children and students with asthma management, and partnering to reduce environmental triggers in the home, child care, school, work and other settings.[59]

Data for the Asthma Management and Quality of Life sections were obtained from several sources, including the N.C. BRFSS, the N.C. YRBS, the N.C. CHAMP, the N.C. School Health Education Profile: Principal's Survey, and the National Survey on Children's Health. (For more detailed information about these and other data sources used in this document, please see Appendix A.)

Symptoms and Severity Of Asthma

The severity of asthma can vary in individuals greatly. The National Heart, Lung, and Blood Institute released the National Asthma Education and Prevention Program Guidelines for the Diagnosis and Management of Asthma in 1997, with an update in 2002 (table 10). These guidelines provide a stepwise approach for managing asthma based on frequency of symptoms and lung function. By determining the severity of a person's asthma and using the stepwise approach for management, the ultimate goal of asthma control will be achieved. Asthma control includes: minimal or no chronic symptoms day or night/ minimal or no exacerbations; no limitations on activities (no school/work missed); maintenance of (near) normal pulmonary function; minimal use of short-acting inhaled $beta_2$-agonist; and minimal or no adverse effects from medications. Below is the stepwise approach for managing asthma for adults and children older than 5 years of age.[18]

Table 10. Stepwise Approach for Managing Asthma in Adults and Children Older Than 5 Years of Age[16]

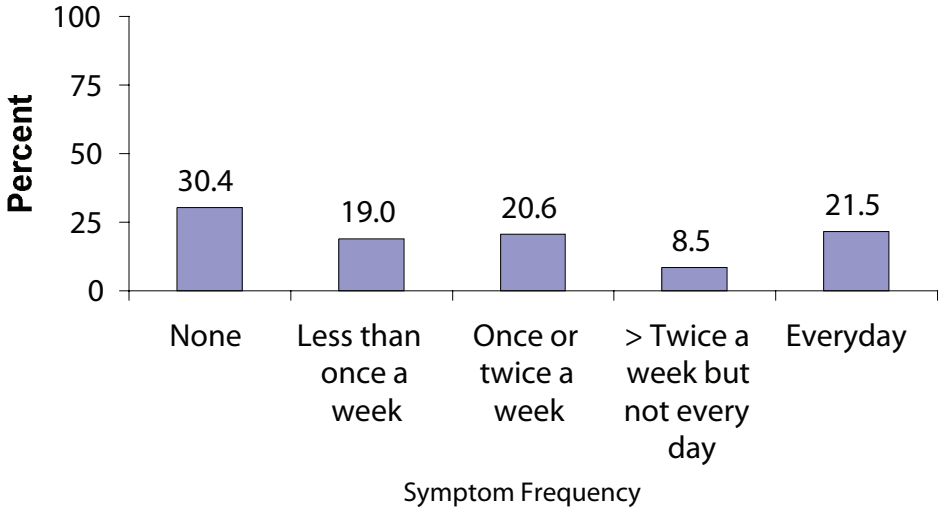
Classify Severity: Clinical Features Before Treatment or Adequate Control			Medications Required to Maintain Long-Term Control
	Symptoms Day/ Symptoms Night	PEF or FEV_1 PEF Variability	Daily Medications
Step 4 Severe Persistent	Continual/ Frequent	≤ 60% > 30%	**Preferred Treatment:** High-dose inhaled corticosteroids and long-acting inhaled $beta_2$-agonist
Step 3 Moderate Persistent	Daily / > 1 night/week	> 60%- < 80% > 30%	**Preferred Treatment:** Low-to-medium dose inhaled corticosteroid and long acting inhaled $beta_2$-agonist
Step 2 Mild Persistent	> 2/week but < 1x/day / > 2 nights/month	≥ 80% 20-30%	**Preferred Treatment:** Low-dose inhaled corticosteroids
Step 1 Mild Intermittent	≤ 2 days/week/ ≤ 2 nights/month	≥ 80% < 20%	No daily medications needed

Adults

The N.C. BRFSS looks at self reported frequency of symptoms for adults with current asthma, which allows for an estimation of the severity of asthma among North Carolina adults.

Daytime Symptoms

Figure 16. How Often During the Past 30 Days Have Persons with Asthma Reported having Symptoms[1] of Asthma[2], Adults (≥ 18 years), North Carolina, 2005



[1]Symptoms of asthma include cough, wheezing, shortness of breath, chest tightness and phlegm production when you don't have a cold or respiratory infections.
[2]Responses to the question "Symptoms of asthma include cough, wheezing, shortness of breath, chest tightness and phlegm production when you don't have a cold or respiratory infection. During the past 30 days, how often did you have any symptoms of asthma?" Question was asked only of those who reported having asthma currently.

	None	Less than once a week	Once or twice a week	> Twice a week but not every day	Everyday
2005 %	30.4%	19.0%	20.6%	8.5%	21.5%
(95% CI)	(26.9, 34.0)	(16.1, 22.2)	(17.3, 24.2)	(6.8,10.7)	(18.1, 25.4)

Data Source: BRFSS, North Carolina, 2005

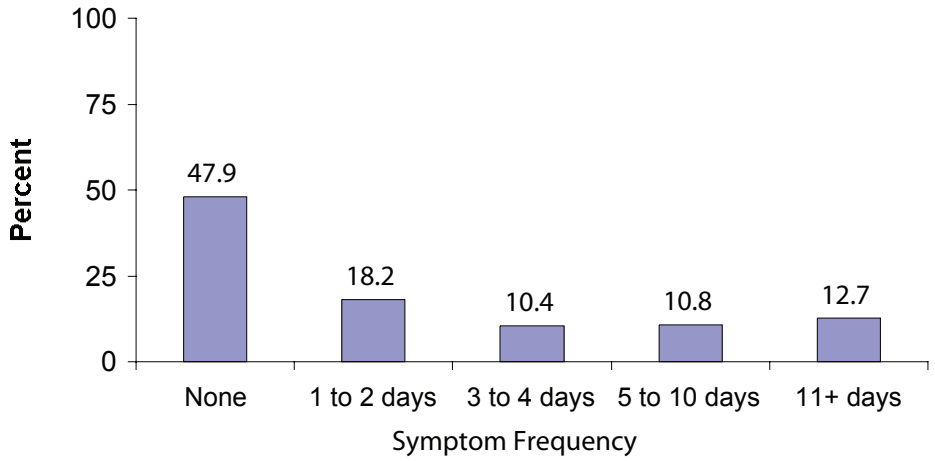
Summary of Figure 16:

- Almost 70% of adults with current asthma reported having any symptoms of asthma in the past 30 days.
- Almost 50% of North Carolina adults with current asthma report experienced asthma symptoms at least once a week over the past 30 days.
- No significant gender or race differences were seen in the frequency of asthma symptoms over the past 30 days.

Nighttime Symptoms

When looking at the quality of life of persons with asthma, one dimension for measurement is if that person has any disturbances in sleep due to asthma. Patients with asthma have more problems initiating and maintaining sleep than healthy people do.[19] Impaired quality of sleep, with disturbed sleep during the night, early morning awakenings and daytime sleepiness, are common among patients with bronchial asthma.[20] Sleep disturbance (nocturnal awakening) due to asthma is an indicator of both the severity of asthma, and the fact that asthma in not being properly controlled.[16]

Figure 17. How Many Times in the Past 30 Days Have Persons with Asthma Had Difficulty Staying Asleep Due to Their Symptoms of Asthma[1], Adults (≥ 18 years), North Carolina, 2005



[1]Responses to the question "During the past 30 days, how many days did symptoms of asthma make it difficult for you to stay asleep?" Question was asked only of those who reported having asthma currently.

	None	1 to 2 days	3 to 4 days	5 to 10 days	11+ days
2005 %	47.9%	18.2%	10.4%	10.8%	12.7%
(95% CI)	(42.9, 52.8)	(14.6, 22.3)	(7.9, 13.6)	(7.9, 14.8)	(10.0, 16.1)

Data Source: BRFSS, North Carolina, 2005

Summary of Figure 17:

- Of North Carolina adults with current asthma, over half experienced symptoms of asthma which made it difficult for them to stay asleep at least one night out of the past 30 days.
- Thirty-three percent of adults with current asthma reported that asthma symptoms made it difficult for them to stay asleep more than two nights in the past month.

Asthma Attack or Episode

Asthma attack prevalence, the number of people who had at least one asthma attack in the previous year, is a crude indicator of how many people have uncontrolled asthma and are at risk for a poor outcome, such as hospitalization.[12] There are triggers in the

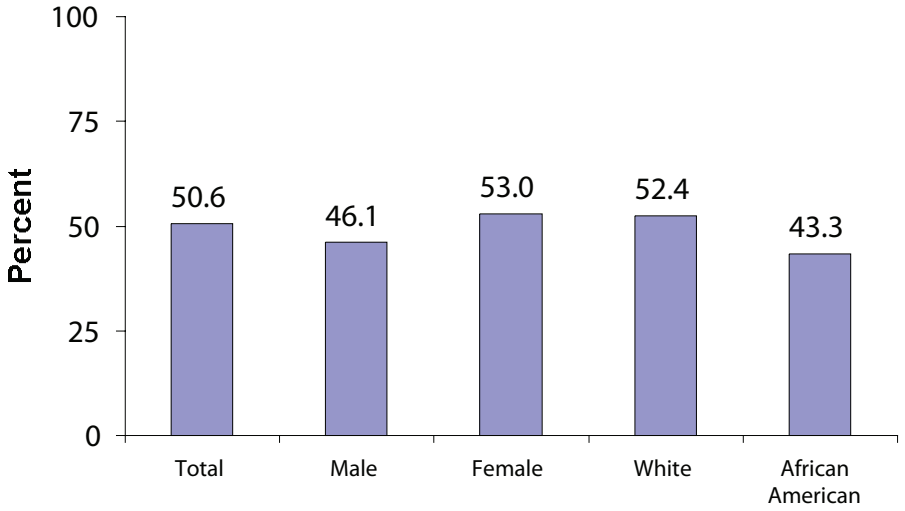
environment that can lead to asthma attacks. These triggers include allergens and irritants, which may be able to be reduced and controlled in some situations. These will be discussed later in this chapter.

Three surveys were analyzed to determine the asthma attack prevalence for North Carolinians: the N.C. BRFSS, the N.C. YRBS, and the National Survey of Children's Health.

Adults

For adults (≥ 18 years old), the N.C. BRFSS was used. The N.C. BRFSS asked *"During the past 12 months, have you had an episode or an asthma attack?"* This question was only asked of those who have current asthma.

Figure 18. Persons With Asthma Who Have Had an Asthma Episode or Asthma Attack in the Past 12 Months[1], by Sex and Race, Adults (≥18 years), North Carolina, 2005



[1]Response to the question "During the past 12 months, have you had an episode of asthma or an asthma attack?" Question was asked only of those who reported having asthma currently.

	Asthma Attack or Episode	
2005	Percent (%)	95% CI
Total	50.6	46.4-54.8
Male	46.1	37.9-54.7
Female	53.0	48.4-57.5
White	52.4	47.6-57.1
African American	43.3	33.9-53.2

Data Source: North Carolina BRFSS, 2005

Summary of Figure 18:

- Approximately half of North Carolina adults with current asthma experienced an asthma attack or episode in the past twelve months.
- There were not any significant gender or racial differences seen in the prevalence of asthma attacks.

High School Students (grades nine through 12)

The N.C. YRBS looked only at students in the grades nine through 12 and asked the question, *"Among students with current asthma, the percentage who had an episode of asthma or an asthma attack during the past 12 months."*

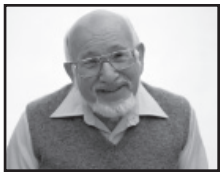


Table 11. High School Students With Current Asthma Who Have Had an Episode of Asthma or an Asthma Attack During the Past 12 Months, Age, Grade, Race, and Sex, North Carolina and United States, YRBS[1], 2005

	Total Percent (95% CI)	Males Percent (95% CI)	Females Percent (95% CI)
North Carolina	31.3% (27.1-35.4)	22.6% (17.2- 28)	39.5% (32.2-46.8)
United States	37.9% (± 2.9)	30.4% (± 4.1)	45.7% (± 4.3)
AGE – N.C. only			
Age ≤ 15	31.4% (24.4-38.3)	24.4% (15.7-33)	39.5% (31.4- 47.5)
Age 16 or 17	30% (23.6-36.3)	24.1% (16.6- 31.7)	35.3% (24.1- 46.6)
Age ≥ 18	*	*	*
GRADE			
9th Grade - N.C.	28.6% (17.7- 39.6)	*	39.3% (26.9-51.7)
U.S.	38.6% (± 3.6)	32.3% (± 7.3)	44.7% (± 6.5)
10th Grade - N.C.	32.8% (25.2- 40.5)	*	*
U.S.	40.7% (± 6.5)	32.2% (± 6.4)	48.8% (± 9.3)
11th Grade – N.C.	33.5% (25.0- 41.9)	*	*
U.S.	37.4% (± 5.4)	30.7% (± 7.5)	45.6% (± 8.6)
12th Grade - N.C.	*	*	*
U.S.	34.3% (± 6.7)	23.2% (± 8.0)	43.4% (± 8.5)
RACE/ETHNICITY			
African American – N.C.	28.8% (21.3- 36.4)	*	*
U.S.	33.0% (± 5.1)	23.8% (± 8.0)	42.2% (± 7.2)
Hispanic/Latino - N.C.	*	*	*
U.S.	35.2% (± 6.5)	32.7% (± 10.0)	37.8% (± 11.3)
White – N.C.	34.2% (29.8- 38.7)	25% (16.2- 33.7)	43.7% (36-51.4)
U.S.	40.5% (± 3.8)	31.6% (± 5.3)	48.9% (± 5.9)

[1]Data is weighted
*Fewer than 100 cases
Data Source: YRBS, North Carolina, 2005

Summary of Table 11:

- High School females with asthma in North Carolina have a significantly higher prevalence of asthma attacks (39.5%) than males (22.6%).
- While the national data points to females having a higher prevalence of asthma attacks than males in all grades, only females in grades 10 and 12 were shown to be statistically significant.
- In North Carolina, white high school females had a significantly higher prevalence of asthma attacks (43.7%) than white high school males (25%). The national data showed similar significant results between genders for white high school students, as well as African American females having a significantly higher prevalence of asthma attacks than males.

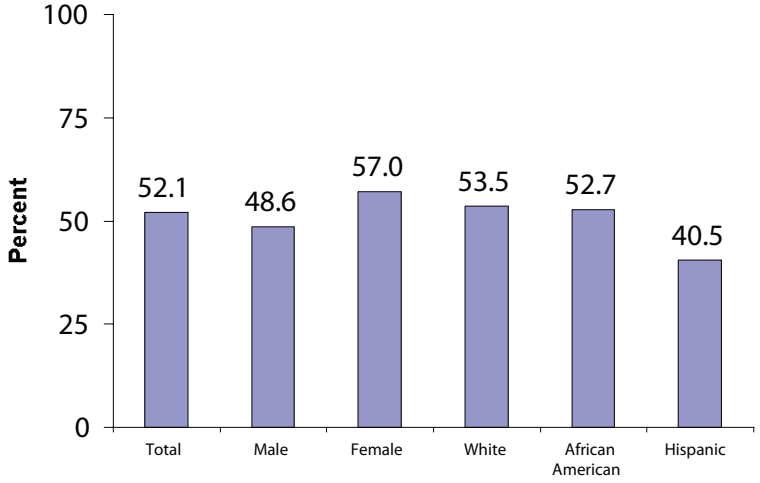
Additional data for the N.C. YRBS is available in Appendix F.

Children

The 2004 National Health Interview Survey reported that almost 4 million children in the U.S. had an asthma attack in the past 12 months. African American children were more likely than Hispanic children to have had an attack in the past 12 months. Children in fair or poor health were more than seven times as likely to have had an asthma attack in the past 12 months (29.0%) as children in excellent or very good health (4.0%).[14]

The National Survey of Children's Health focused on children (≤ 17 years old). A survey was conducted throughout the United States, including North Carolina, and asked, *"How many children/youth reported as ever having asthma, had an asthma attack in the last 12 months."*

Figure 19. Children With Asthma Who Have Had an Asthma Episode or Asthma Attack in the Past 12 Months[1], by Sex and Race, Children (≤ 17 years), North Carolina, 2003.



[1]Response to the question "During the past 12 months, has your child had an episode of asthma or an asthma attack?" Question was asked only of those who reported having asthma currently.
Data Source: National Survey of Children's Health, 2003

Table 12. Percent of Children (≤ 17 years) who have had an Asthma Episode or Asthma Attack in the Past 12 Months, by Sex and Race, United States and North Carolina, 2003

	Asthma Attack or Episode in the Past 12 Months	
	Percent (%)	95% CI
United States	46.4	44.8-47.9
North Carolina	52.1	44.5-59.7
Sex		
Male	48.6	38.8-58.5
Female	57.0	45.1-68.6
Race/Ethnicity		
White	53.5	43.5-63.5
African American	52.7*	38.7-66.8
Hispanic	40.5	18.7-62.4

*Use caution in interpreting cell sizes less than 50.
Data Source: National Survey of Children's Health, 2003

Summary of Figure 19 and Table 12:

- Fifty-two percent of North Carolina children with asthma had an asthma attack in the past 12 months. This is higher than the national data.
- No significant gender or racial differences were found in this data.

Health Related Quality Of Life

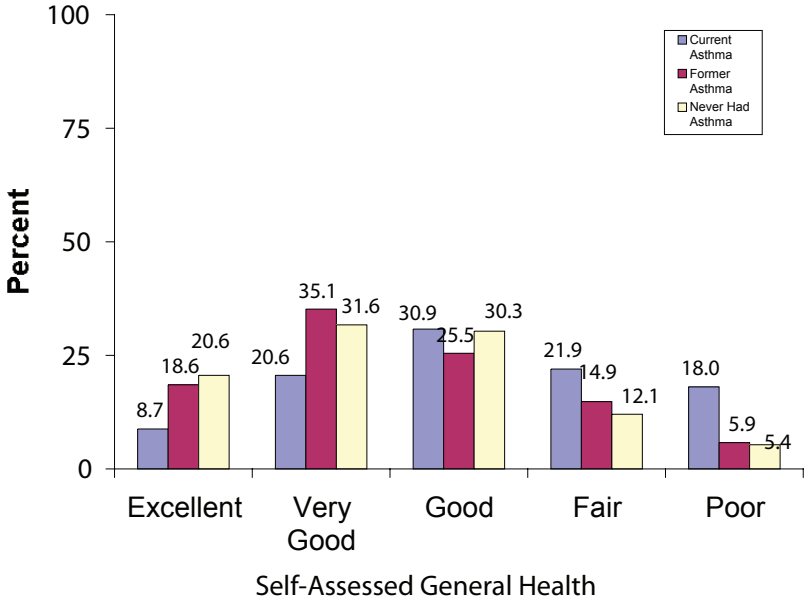
Quality of life measures are increasingly being used to supplement the more traditional measures of morbidity and mortality. Today, health status is being viewed by the public health community as a multidimensional construct. As medical and public health advances have led to better treatment and delayed mortality, it seems logical that health outcome measures would need to assess not only the saving of lives, but also the quality of lives. Quality of life conveys an overall sense of well-being, including the ability to attempt to assess aspects of happiness and satisfaction with life as a whole. Health related quality of life and its determinants have evolved to encompass those aspects of overall quality of life that can be clearly shown to affect health – both physical and mental.[21]

In the study *Self-Reported Asthma and Health Related Quality of Life* by Ford et al, the authors concluded that asthma had a major negative impact on the health related quality of life in the community and that its impact was similar to that of other chronic health conditions. It was found that persons with asthma have worse health-related quality of life than respondents who previously had asthma or those who never had asthma.[22]

Adults

Health-related quality of life questions are included in the N.C. BRFSS. Participants are asked *"What would you say your general health is: Excellent, Very Good, Good, Fair, Poor?"* Figure 20 looks at the responses from adults in North Carolina with current asthma, as well as those living without it.

Figure 20. Adults (≥ 18 years) With Current Asthma and Reporting of General Health Status, North Carolina, 2004



Data Source: SCHS, BRFSS, North Carolina, 2004

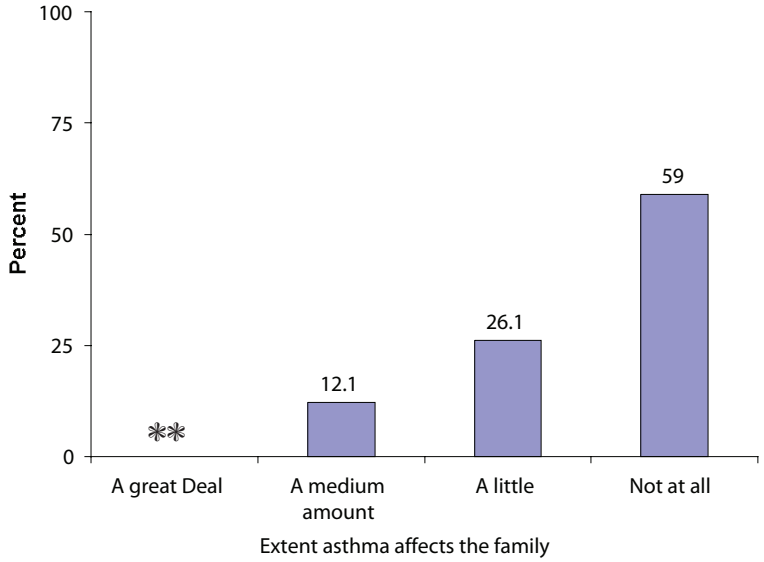
Summary of Figure 20:

- Adults in North Carolina with current asthma reported having a worse general health status than those without current asthma.

Researchers have shown that patients with asthma have impaired quality of life.[22] This is an area that North Carolina should continue to monitor and work to improve.

Children

Figure 21. Extent to Which Child's Asthma Affects the Family, North Carolina, 2003[1]



[1]Responses to the question "Overall, would you say your child's asthma puts a burden on your family a great deal, a medium amount, a little, or not at all?" Question was asked only of those who reported having asthma currently.
Data Source: National Survey of Children's Health, 2003

	A Great Deal	A Medium Amount	A Little	Not At All
%	**	12.1%*	26.1%*	59.0%
(95% CI)		(5.2, 19.1)	(18.4, 33.8)	(50.0, 68.0)
Count		16	49	94

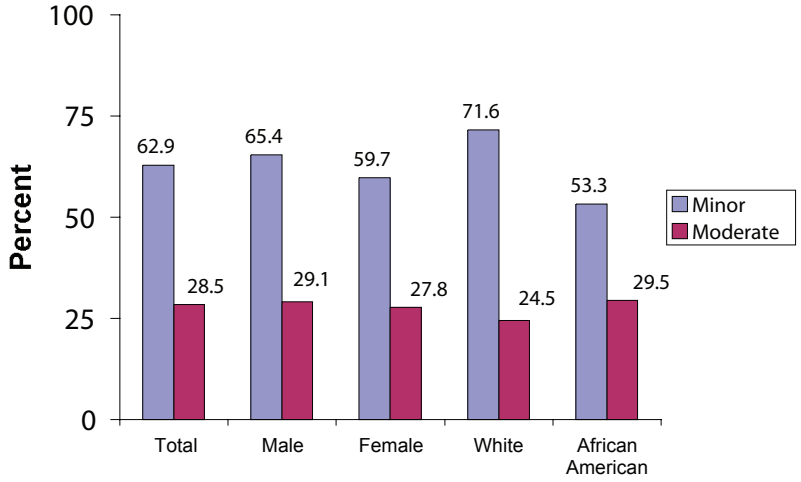
*Use caution in interpreting cell sizes less than 50.

**Estimates based on sample sizes too small to meet standards for reliability or precision.
Data Source: National Survey of Children's Health, 2003

Summary of Figure 21:

- According to the National Survey of Children's Health in 2003, of the children with current asthma in North Carolina, 14.9% have asthma that presents a great or medium amount of burden on the family.[37]

Figure 22. Level of Health Difficulties Caused by Asthma Among Children/Youth (≤ 17 years), North Carolina, 2003[1,2]



[1]Response to the question "Would you describe the health difficulties caused by your child's asthma as minor, moderate, or severe?" Question was asked only of those who reported having asthma currently.
[2]Responses for the level severe were too small to meet standards of reliability or precision and thus have been omitted.

	All NC Children	Male	Female	White	African American
Minor					
%	62.9%	65.4%	59.7%*	71.6%	53.3%*
(95% CI)	(53.9, 71.8)	(54.1, 76.7)	(45.6, 73.8)	(60.3, 82.9)	(37.3, 69.3)
Count	105	60	45	64	28
Moderate					
%	28.5%	29.1%*	27.8%*	24.5%*	29.5%*
(95% CI)	(20.5, 36.5)	(18.4, 39.9)	(15.9, 39.7)	(13.9, 35.1)	(15.6, 43.4)
Count	51	28	23	22	18

* Use caution interpreting, cell size smaller than 50
Data Source: National Survey of Children's Health, 2003

Summary of Figure 22:

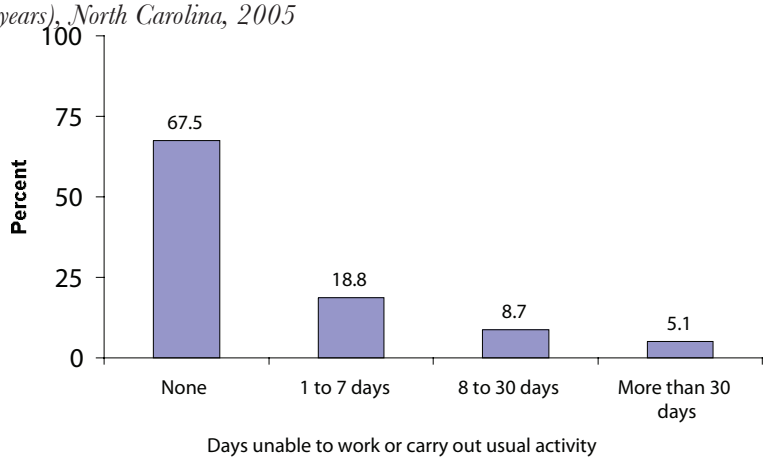
- Over one-half of parents of children with current asthma in North Carolina would describe the difficulties caused by their child's asthma as moderate.

Missed Activity

Quality of life of persons with asthma can also be measured by looking at activity restriction and missed activity (including missed school or work days) due to asthma. Asthma interferes with daily activities, including attending school and going to work. According to the 2002 National Health Interview Survey, conducted by the National Center for Health Statistics at the CDC, adults 18 years of age and over who were currently employed missed 11.8 million work days due to asthma. Children five to 17 years of age missed 14.7 million school days due to asthma.[12]

Adults

Figure 23. Number of Days Unable to Work or Carry Out Usual Activities Because of Asthma[1], Adults (≥ 18 years), North Carolina, 2005



[1]Responses to the question "During the past 12 months, how many days were you unable to work or carry out your usual activities because of your asthma?" Question was asked only of those who reported having asthma currently.

	None	1 to 7 days	8 to 30 days	More than 30 days
2005 %	67.5%	18.8%	8.7%	5.1%
(95% CI)	(63.5, 71.3)	(15.4, 22.7)	(6.8, 11.0)	(3.8, 6.6)

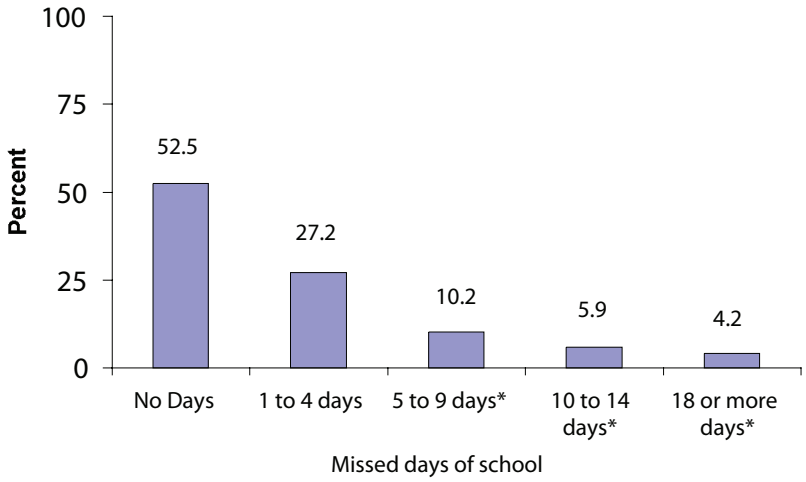
Data Source: BRFSS, North Carolina, 2005

Summary of Figure 23:

- Thirty-two percent of adults with asthma were unable to work or carry out normal activity due to their asthma at least one day during the last 12 months. Five percent were unable to work or carry out normal activities for more than 30 days.
- There were no gender or racial differences in the number of days unable to work or carry out usual activity due to asthma.

Children

Figure 24. Number of Days of Daycare or School That Children Missed Due to Asthma[1], Children (≤ 17 years), North Carolina, 2005



[1]Responses to the question "During the past 12 months, how many days of daycare or school did your child miss due to asthma?" Question was asked only of those who reported having asthma currently.

	No days	1 to 4 days	5 to 9 days	10 to 14 days	15 or more days
%	52.5	27.2	10.2*	5.9*	4.2*
95% CI	46.3-58.7	22.2-32.9	6.9-14.8	3.5-9.7	2.1-8.0

*Based on numerator less than 50, interpret with caution.
Data Source: CHAMP North Carolina, 2005

Summary of Figure 24:

- Of children with current asthma in North Carolina, 47.5% missed at least one day of school due to their asthma in the last year. Thirty-seven percent of children with asthma missed between one and nine days of school in the past 12 months due to their asthma, and 10% of children with asthma missed 10 or more days due to their asthma.
- No significant gender differences were seen in missed days of daycare or school due to asthma.

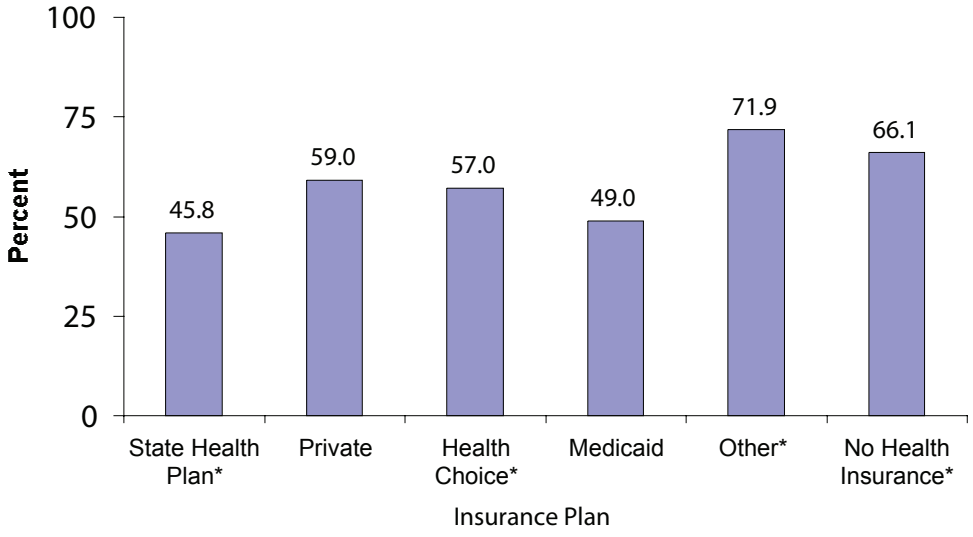
Children with asthma are 37 times as likely to miss school as children without asthma symptoms.[23]

Asthma Management Activities

Asthma is a chronic disease that requires effective control and management. Each child, youth or adult with asthma will have specific medical and social needs and concerns that are important to his or her ongoing successful treatment and management. An asthma management or action plan should be developed jointly with the patient, health care provider and also with the family.[24] An asthma management plan guides the child and adult living with asthma to self-manage or co-manage his or her condition by using tools like medication and spirometry at home, child care, school, and work.

This plan should be used as part of an overall effort to educate children and adults in self-management.[18] An individualized asthma management plan should include strategies for: identifying and controlling or reducing indoor and outdoor asthma triggers; taking medication(s) as recommended by a health care professional; monitoring and recognizing early objective and subjective signs and symptoms of an acute episode of asthma or of poorly controlled asthma; and providing a plan for what to do in case of an emergency. The emergency plan will also include contact information for the health care provider and even for a local hospital. An asthma management plan helps the child, adult, and family with his or her health care provider to establish a course of action for managing asthma. Asthma Management plans are needed for use in schools and child and adult care facilities. These plans should be provided to and used by patients, families, school staff, and other providers who care for the child or adult.[25]

Figure 25. Children (≤ 17 years) With Current Asthma Who Have Been Given an Asthma Management Plan From Their Doctor or Other Health Professional, by Health Insurance[1], North Carolina, 2005



[1]Responses to the question "Has a doctor or other health professional ever given you an asthma management plan for your child?" Question was asked only of those who reported having asthma currently.

	Total	State Health Plan	Private	Health Choice	Medic-aid	Other	No Health Insur-ance
%	56.9%	45.8%*	59.0%	57.0%*	49.0%	71.9%*	66.1%*
95% CI	50.7-62.9	24.3-68.9	49.4-67.9	35.6-76.1	37.8-60.4	54.8-84.4	40.6-84.8

*Based on numerator less than 50, interpret with caution.
Data Source: CHAMP North Carolina, 2005

Summary of Figure 25:

- Almost 57.0% of parents (or caregivers) of children with current asthma reported that they have not received an asthma management plan from their child's doctor or other health professional. This means that 43.0% of parents (or caregivers) have not received an asthma management plan for their child with current asthma.
- There were no differences between health insurances and children receiving asthma management plans. However, it is important to note that between 28.1% and 54.2% of children in each of these plans did not receive an asthma management plan from their doctor or other health professional.

Children in grades six through eight were significantly more likely to receive an asthma management plan from a doctor or health professional (69.4%) than children who were not in school[f] (36.6%). There were no gender or racial differences in who receives an asthma management plan.

Asthma Management in Schools

In 2005, North Carolina passed the "self medication" law (statute 115C-375.2.). This law states that students with asthma can carry and self-administer their asthma medication at school. (Box 1 contains portion of the law that discusses asthma medication. The full text of the law can be found in Appendix B.)

[f]The group of children "not in school" in the CHAMP survey can consist of children age 17 and younger who are drop-outs, or have already graduated. However, this group is primarily made up of children who are too young to have started school.

§ 115C-375.2. Possession and self-administration of asthma medication by students with asthma

(a) Local boards of education shall adopt a policy authorizing a student with asthma…to possess and self-administer asthma medication on school property during the school day, at school-sponsored activities, or while in transit to or from school or school-sponsored events….The policy shall include a requirement that the student's parent or guardian provide to the school:

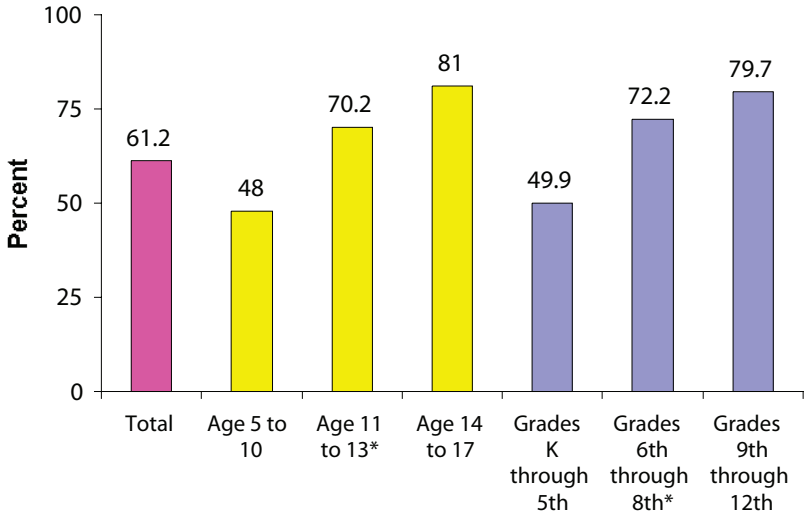
1) Written authorization from the student's parent or guardian for the student to possess and self-administer asthma medication.

2) A written statement from the student's health care practitioner verifying that the student has asthma…and that the health care practitioner prescribed medication for use on school property during the school day, at school-sponsored activities, or while in transit to or from school or school-sponsored events.

3) A written statement from the student health care practitioner who prescribed the asthma medication that the student understands, has been instructed in self-administration of the asthma medication, and has demonstrated the skill level necessary to use the asthma medication and any device that is necessary to administer the asthma medication.

The N.C. CHAMP asked respondents (parents and guardians of children with current asthma) if, *"At school, is your child allowed to self administer emergency medication for asthma?"*

Figure 26. Percentage of Children With Current Asthma Allowed to Self-Administer Emergency Medication for Asthma at School, North Carolina, 2005



	Ability to Self Administer Emergency Asthma Medication	
2005	Percent	95% CI
Total	61.2%	54.0-46.0
Age 5 to 10	48.0%	37.8-58.3
Age 11 to 13	70.2%*	54.9-82.0
Age 14 to 17	81.0%	69.0-89.1
Grades K through 5th	49.9%	39.9-60.0
Grades 6th though 8th	72.2%*	58.3-82.8
Grades 9th through 12th	79.7%	66.2-88.7

*Based on numerator less than 50, interpret with caution.
Data Source: North Carolina CHAMP, 2005

Summary of Figure 26:

- Sixty-one percent of respondents reported that their children with current asthma had the ability to self-administer emergency asthma medication at school.
- The data suggests that older children with current asthma have more freedom to self-administer emergency asthma medication than younger children.

Asthma is the leading cause of school absenteeism. Approximately three students in a classroom of 30 will have asthma. Uncontrolled asthma can result in reduced performance for the child with asthma and disruptions for the entire classroom.[35] Therefore, it is important that school staff understand the issues involved with asthma and asthma management in schools. A healthy student is a student ready to learn. In the document *"Strategies for Addressing Asthma Within a Coordinated School Health Program"*, the Centers for Disease Control and Prevention outlines six strategies for schools to consider when addressing asthma:

1. Establish management and support systems for asthma-friendly schools.
2. Provide appropriate school health and mental services for student with asthma.
3. Provide asthma education and awareness programs for students and school staff.
4. Provide a safe and health school environment to reduce asthma triggers.
5. Provide safe, enjoyable physical education and activity opportunities for students with asthma.
6. Coordinate school, family, and community efforts to better manage asthma symptoms and reduce school absences among students with asthma.[35]

While the CDC recognizes that every school will not be able to implement each strategy, schools should determine which strategies have the highest priority on the basis of the needs of the school and available resources.[26]

North Carolina has been collecting and assessing some of the asthma-related resources and needs in the schools. The North Carolina School Health Education Profile: Principal's Survey examined 402 randomly selected middle and high schools in the state in 2002 and 2004. Of those that were sent the survey, 281 principals completed the survey, representing 158 middle schools, 111 high schools, and 12 junior/senior combined schools. This survey was designed to monitor the status of school health and physical education at the middle and high school levels.

Table 13. Asthma Management in North Carolina Secondary Public Schools, North Carolina, 2002 and 2004

	Middle School		High School		National Median*
	2002	2004	2002	2004	2004
Percent of schools that have a full-time registered nurse	12.0%	10.0%	19.0%	9.0%	36.1%
Percent of schools that identify and track all students with asthma	82.0%	90.0%	68.0%	79.0%	85.8%
Percent of schools that obtain and use an asthma action plan or individualized health plan for all students with asthma	66.0%	80.0%	53.0%	70.0%	62.2%
Percent of schools that assure immediate access to medication as prescribed by a physician and approved by parents	96.0%	95.0%	97.0%	94.0%	92.9%
Percent of schools that provide intensive case management for students with asthma who are absent 10 days or more per year	43.0%	49.0%	39.0%	38.0%	35.4%
Percent of schools that educate staff about asthma	64.0%	76.0%	46.0%	60.0%	53.7%
Percent of schools that educate students with asthma about asthma management	56.0%	75.0%	52.0%	45.0%	52.4%
Percent of schools that educate all students about asthma awareness in at least one grade	23.0%	41.0%	19.0%	28.0%	25.8%

*For all secondary schools
Data Source: 2002/2004 North Carolina School Health Education Profile Principal's Survey, Department of Public Instruction, Grunbaum (Department of Health and Human Services School Health Profiles)[43]

Summary of Table 13:

- From 2002 to 2004 there was a decrease in the number of full-time registered nurses in both middle and high schools. Both of these numbers fall well below the national median.
- An increase has been seen in the amount of both middle and high schools that identify and track all students with asthma.
- North Carolina middle and high schools are above the national median for percent of schools that obtain and use an asthma action plans (or individualized health plans) for all students with asthma.
- Less than half of North Carolina public schools provide intensive case management for students with asthma who are absent 10 days or more per year.
- Three-fourths of North Carolina middle schools educate both their staff and students with asthma about asthma and asthma management; however, only 60.0% of high schools educate staff, and only 45.0% educate students with asthma.

Asthma and School Physical Education Classes

Asthma is one of the top three reasons, behind physical disabilities (65.7%) and religious reasons (42.2%), for students to be exempt from physical education.[27] Physical fitness is important for all students, yet students with asthma often restrict their physical activities. Much of this restriction is unnecessary; children with asthma can be physically active. Today's treatments can successfully control asthma so that students can participate fully in physical activities most of the time. The National Heart, Lung and Blood Institute (NHLBI) of the National Institutes of Health (NIH), produced a manual: *Asthma and Physical Activity in the School: Making a Difference*, which denotes the steps for helping students control their asthma and still participate in school physical education classes.[28] For physical education students to control their asthma, they need to recognize their asthma triggers, avoid or control their triggers, and follow their asthma management plan. Physical education teachers can assist students with asthma by ensuring that the students with asthma have convenient access to their medications, and modifying physical activities to match the child's current asthma action plan as indicated by the health care team.[28]

Table 14. Asthma Management in North Carolina Secondary Public Schools, North Carolina, 2002 and 2004

	Middle School		High School		National Median*
	2002	2004	2002	2004	2004
Percent of schools that encourage full participation in physical education and physical activity when students with asthma are doing well	94.0%	95.0%	99.0%	92.0%	96.4%
Percent of schools that provide modified physical education and physical activities as indicated by the student's asthma action plan.	87.0%	93.0%	83.0%	83.0%	84.9%

Data Source: 2002/2004 North Carolina School Health Education Profile Principal's Survey, Department of Public Instruction, Grunbaum (Department of Health and Human Services School Health Profiles)[43]

Environmental Triggers

Asthma triggers are factors that can cause an asthma episode, or make asthma worse. Avoiding or controlling these triggers is necessary to successfully controlling a person's asthma.[28] Environmental asthma triggers occur in both indoor and outdoor settings.

Outdoor environmental triggers include outdoor air pollution like exhaust from cars and factories, smoke and road dust. The Air Quality Index (AQI) is a tool that offers information about whether the air quality could affect ones health. Colors are used to show how much pollution is in the air. Green and yellow indicate that air pollution levels are low, while orange, red, and purple indicate that air pollution are at points that may make asthma worse.[29] Other outdoor asthma triggers include cold weather and allergens, which include pollen from trees, plants, and grasses.[28]

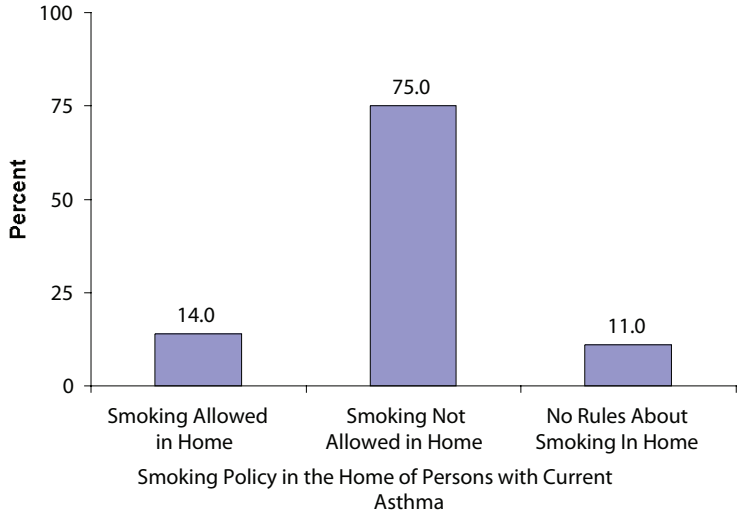
Indoor allergens and irritants often play a significant roll in triggering asthma episodes and attacks. Indoor asthma triggers include secondhand smoke, dust mites, mold, cockroaches and other pests, household pets, and nitrogen dioxide, which is a by-product of fuel burning appliances. Each of these environmental triggers can be controlled if not completely removed from the living area of the person living with asthma.

Secondhand smoke is one of the most preventable indoor environmental asthma triggers. According to the North Carolina Youth Tobacco Survey (YTS), 40.5% of middle schoolers and 42.6% of high schoolers live in homes where others smoke.[38,39] Secondhand smoke is exhaled smoke from smokers and the side stream smoke from the burning end of cigarettes, cigars, or pipes. Secondhand smoke is a known human carcinogen (cancer-causing agent). More than 50 compounds in secondhand smoke have been identified as known or reasonably anticipated human carcinogens. Secondhand smoke contains at least 250 chemicals that are known to be toxic or carcinogenic.[60] Secondhand smoke can trigger asthma episodes and increase the severity of attacks. This smoke is a factor related to new cases of asthma in children who have not already exhibited asthma symptoms.[32]

According to the 2006 Surgeon General's report on the Health Consequences of Involuntary Exposure to Tobacco Smoke, secondhand smoke (also referred to as environmental tobacco smoke) exposure places children at increased risk for sudden infant death syndrome, acute respiratory infections, ear problems, and more severe asthma. Smoking by parents causes respiratory symptoms and slows lung growth in their children. The Surgeon General's report concludes that sufficient evidence exists to infer a clear causal relationship between secondhand smoke exposure from parental smoking and the onset of wheeze illnesses in early childhood. The report also states the evidence is suggestive but not sufficient to infer a causal relationship between secondhand smoke exposure from parental smoking and the onset of childhood asthma. The Surgeon General's report also looked at adult asthma. The evidence found was suggestive but not sufficient to infer a causal relationship between secondhand smoke exposure and adult-onset asthma; and the evidence was suggestive but not sufficient to infer a causal relationship between secondhand smoke exposure and a worsening of asthma control.[33]

The report went on to state that there is no risk-free or minimally acceptable level of exposure to secondhand smoke. Millions of American children and adults are exposed to secondhand smoke in their homes and workplaces. Eliminating smoking in indoor spaces fully protects nonsmokers from exposure to secondhand smoke.[33]

Figure 27. Secondhand Smoke Policies in the Home of Adults (≥ 18 years) with Current Asthma, North Carolina, 2004



Smoking in the Home	Persons with Current Asthma Percent (95% CI)
Smoking Allowed in Home	14.0% (11.5-16.5)
Smoking Not Allowed in Home	75.0% (71.7-78.3)
No Rules About Smoking in Home	11.0% (8.5-13.4)

Confidence Intervals rounded to nearest tenth
Data Source: SCHS, BRFSS, North Carolina, 2005

Summary of Figure 27:

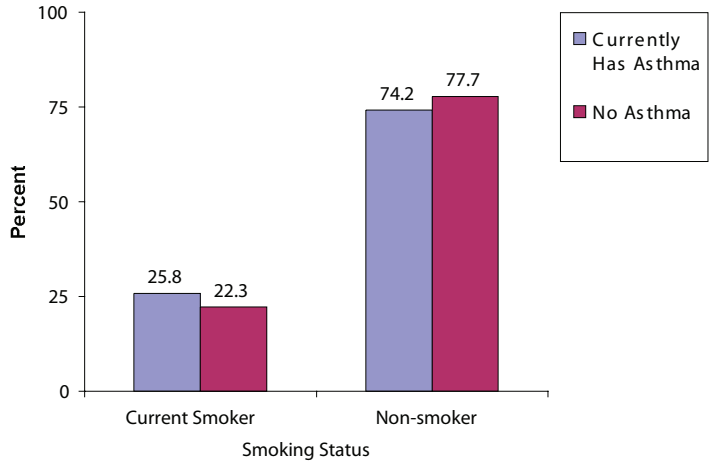
- Fourteen percent of adults with current asthma in North Carolina live in a home where smoking is explicitly allowed.

Smoking

Smoking injures almost all bodily organs, and tragically these injuries often lead to incurable diseases and death.[34] Nationally, nearly 21.0% of adults (44.5 million people) are current cigarette smokers.[36] According to the 2005 N.C. BRFSS, 22.6% of North Carolinians age 18 and older are current smokers.[5] According to the 2004 Surgeon General's report The *Health Consequences of Smoking*, while the evidence is inadequate to infer the presence or absence of a causal relationship between active smoking and asthma in adults, there is sufficient evidence to infer a causal relationship between active smoking and poor asthma control.[34]

The 2005 N.C. BRFSS shows that adults with asthma in North Carolina are as likely to report that they are current smokers as adults without asthma.

Figure 28. Asthma Status of North Carolina Adults (≥ 18 years) Who Smoke, North Carolina, 2005



Asthma Status	Smoking Status	Percent (95% CI)
Current Asthma	Current Smoker	25.8% (22.2- 29.3)
	Non-Smoker	74.2% (70.7- 77.8)
Does Not Have Current Asthma	Current Smoker	22.3% (21.4- 23.2)
	Non-Smoker	77.7% (76.8- 78.6)

Confidence intervals rounded to nearest tenth
Data Source: SCHS, BRFSS, North Carolina, 2005

While children aged 17 and younger comprise a smaller percentage of current smokers than adults, smoking is still an issue in this age group. According to the 2005 YTS, 5.8% of middle school students and 20.3% of high school students are current smokers.[38,39] In the N.C. School Asthma Survey conducted in 1999-2000, approximately 16% of the 7th and 8th graders surveyed reported smoking regularly (or current smokers) (at least one cigarette a day for the last 30 days). Children who smoked were more likely to have asthma and wheezing than those who did not smoke.[13]

Key Findings From This Chapter

- Almost 50% of North Carolina adults with current asthma reported experiencing asthma symptoms a minimum of once a week over the past 30 days. Approximately 20% of those who reported having symptoms a minimum of once a week, reported experiencing asthma symptoms every day during those 30 days.[52]

Asthma Attack or Episode

- Approximately 50% of North Carolinian adults with current asthma experienced an asthma attack or episode in the past 12 months.
- High school females in North Carolina have a higher prevalence of asthma attacks or episodes (39.5%) than North Carolina high school males (22.6%).[54]
- In 2003, half of children (age ≤ 17 years) with current asthma in North Carolina reported having had an asthma attack or episode in the previous 12 months.[37]

Missed Activity

- Thirty-two percent of adults in North Carolina with asthma were unable to work or carry out normal activity due to their asthma at least one day during the last 12 months.[52]
- Of children (age ≤ 17 years) with current asthma in North Carolina, almost half (47.5%) missed at least one day of school due to their asthma in the last year. Of that group, 37% of children with asthma missed between one and nine days of school in the past 12 months due to their asthma, and 10% of children with asthma missed 10 or more days due to their asthma.[53]